भारतीय मानक **IS 334 : 2023**

Indian Standard

बिटुमेन और तार से संबंधित पारिभाषिक शब्दावली

(चौथा पुनरीक्षण)

Glossary of Terms Relating to Bitumen and Tar

(Fourth Revision)

ICS 91.100.50; 93.80.20

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

March 2023 **Price Group 5**

Bitumen, Tar and Related Products Sectional Committee, PCD 06

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Bitumen, Tar and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Product Division Council.

This standard was first published in 1953 and subsequently revised in 1965, 1982, and 2002. Due to considerable developments in the application of bitumen, tar and their products in the engineering and chemical fields resulting in an increase in the number of terms used, it became necessary to revise the standard to standardize the terminology on a more exact basis so as to avoid ambiguity and confusion. The glossary of terms would help in fixing a more precise meaning of words which have acquired too general usage. To facilitate ease of reference, the terms have been arranged alphabetically.

In this revision terminologies 'Saturates, Naphthene Aromatics, Polar Aromatics, Reclaimed Asphalt Pavement (RAP), Recycled Asphalt Paving Mixture and Recycling agent (RA)' have been included based on the advancement taken place in the field. Some of the fundamental physics and chemistry terms which are defined in the textbooks, have been removed from the standard.

The fourth revision has been taken up to keep pace with the latest technological developments and international practices. In this revision following major changes have been made:

a) Terminologies have been divided into two parts namely 'Terminologies for Bitumen and Related Products and Terminologies for Tar and Related Products';
b) New terminologies viz 'Saturates, Naphthene Aromatics, Polar Aromatics, Reclaimed Asphalt Pavement (RAP), Recycled Asphalt Paving Mixture, Recycling agent (RA), Creep and recovery, Industrial Viscosity Maltenes, Non-recoverable, Creep compliance (Jnr), Phase angle and Prime coat' have been included;
c) Some of the physical and chemical terms have been removed from the standard; and
d) Some of the terms have been modified.

In the preparation of this standard, due weightage has been given to International co-ordination among the standards and practices prevailing in other countries and this has been met by drawing assistance from the following references:

a) ASTM D8-18c, Standard Terminology Relating to Materials for Roads and Pavements;
b) BS EN 12597 : 2014, Bitumen and bituminous binders. Terminology;
c) BM1, Terminology of hydrocarbon binders;
d) RILEM Technical Recommendations for the Testing and Use of Construction Materials; and
e) English-French-German Dictionary of technical terms related to Hydrocarbon binders, Hydrocarbon materials, Processes for removing pavement materials and for the rehabilitation of asphalt pavements, Materials and Structures, 25, 171-185, 1992.

The composition of the committee, responsible for formulation of this standard is listed at Annex A.

Indian Standard

GLOSSARY OF TERMS RELATING TO BITUMEN AND TAR

(Fourth Revision)

1 SCOPE

This standard defines the terms relating to the products commercially known as bitumen and tar.

2 TERMINOLOGY

2.1 Terminologies for Bitumen and Related Products

A

2.1.1 *Asphalt* — A natural or artificial mixture in which bitumen is associated with inert mineral matter. The word "bitumen" here refers to the heaviest fraction of petroleum.

2.1.2 *Asphaltenes* — The high molecular weight hydrocarbon fraction precipitated from bitumen by a designated paraffinic naphtha solvent at a specified solvent-asphalt ratio. The asphaltene fraction should be identified by the solvent and solvent-asphalt ratio used.

2.1.3 *Asphalt, Mastic* — A mixture of hard grade bitumen, well graded sand and fillers that can be poured when heated, but requires mechanical manipulation to apply.

2.1.4 *Asphalt, Natural or Native* — A mixture occurring in nature in which bitumen is associated with inert mineral matter.

2.1.5 *Asphalt, Rock* — A naturally occurring rock formation, usually limestone or sandstone, impregnated throughout its mass with a minor amount of bitumen.

B

2.1.6 *Bitumen* — A class of black or dark colored viscous material (solid, semi-solid, liquid) having adhesive and waterproofing properties, derived from crude petroleum by refinery processes or present in natural asphalt, completely or nearly completely soluble in toluene.

2.1.7 *Bitumen, Blown* — Bitumen whose rheological properties have been substantially modified by reaction with air at elevated temperatures, and pressure, sometimes in the presence of catalyst.

2.1.8 *Bitumen, Concrete (Asphaltic Concrete)* — A mixture of coarse aggregate, fine aggregate, with or without filler, and bitumen.

2.1.9 *Bitumen Cutback* — Petroleum bitumen whose viscosity is reduced by the addition of a cut- back solvent derived from petroleum. The cutback can be slow curing, rapid curing and medium curing (*see* IS 217).

2.1.10 *Bitumen Emulsion* — (1) A suspension of minute globules of bitumen in water or in an aqueous solution, (2) a suspension of minute globules of water or of an aqueous solution in liquid bitumen.

2.1.11 *Bitumen Emulsion, Anionic* — A type of emulsified bitumen such that a particular emulsifying agent establishes a predominance of negative charges on the discontinuous phase.

2.1.12 *Bitumen Emulsion, Cationic* — A type of emulsified bitumen such that a particular emulsifying agent establishes a predominance of positive charges on the discontinuous phase.

2.1.13 *Bitumen Emulsion, Slow Setting* — A slow breaking emulsion used for plant or road mixes with graded tine aggregates greater than 20 percent, passes a 2.36 mm sieve and a portion of which may pass a 75 µm sieve. Used in slurry seal, seal coat, soil/s and stabilization, etc.

2.1.14 *Bitumen Emulsion, Rapid Setting* — A quick setting emulsion used for surface treatment, penetration macadam and tack coat.

2.1.15 *Bitumen, Industrial* — Bitumen used for purposes other than the construction or maintenance of paved surfaces.

2.1.16 *Bitumen, Mastic — see* Asphalt, Mastic.

2.1.17 *Bitumen, Natural or Native — see* Asphalt, Natural or Native.

2.1.18 *Bitumen, Paving* — Bitumen used to coat mineral aggregate mainly used in the construction and maintenance of paved surfaces and hydraulic works.

2.1.19 *Bitumen, Rock — see* Asphalt, Rock.

2.1.20 *Bitumen Rubberized* — Bituminous binder whose rheological properties have been modified during manufacture by the use of one or more chemical agents. Such chemical agents include crumb rubber, natural rubber, synthetic polymers, waxes,

and sulphur.

2.1.21 *Bitumen Polymer Modified* — Bituminous binder whose rheological properties have been modified during manufacture by the use of one or more organic polymers.

2.1.22 *Bitumen, Straight Run* — Bitumen obtained as the end product or residue from refining of crude petroleum under direct distillation.

2.1.23 *Bitumen Primer* — A cutback/emulsified bitumen product of low viscosity that penetrate into a base/sub base and designed to penetrate, bond, and stabilize this existing surface and to promote adhesion between it and the construction course that follows.

2.1.24 *Bituminous* — Adjective applicable to binders, to mixtures of binders and aggregates and more generally to any material containing bitumen.

C

2.1.25 *Creep and Recovery* — A standard rheological test protocol whereby a specimen is subjected to a constant load for a fixed time period then allowed to recover at zero load for a fixed time period.

E

2.1.26 *Emulsifier* — A surfactant which when present in small amounts facilitates the formation of an emulsion, or enhances its colloidal stability.

F

2.1.27 *Fire Point* — The lowest temperature corrected to a barometric pressure of 101.3 kPa (760 mm Hg), at which application of an ignition source causes the vapors of a test specimen of the sample to ignite and sustain burning for a minimum of 5 s under specified conditions of test.

2.1.28 *Flash Point* — The lowest temperature corrected to a barometric pressure of 101.3 kPa (760 mm Hg), at which application of an ignition source causes the vapors of a specimen of the sample to ignite under specified conditions of test.

2.1.29 *Flux Oil* — A bituminous material, generally liquid, used for softening other bituminous materials.

I

2.1.30 *Industrial Viscosity* — The property of a fluid by which it resists flow due to internal friction, and one of the methods by which it is measured, is by determining the time taken by 50 cc of the material to flow from a cup through a specified orifice under standard conditions of test and at specified temperature.

L

2.1.31 *Lot* — The quantity of material of the same composition offered for inspection at one time. A lot may consist of the whole or a part of the quantity ordered for.

M

2.1.32 *Maltenes* — A red-brown to black heavy oil material remaining after precipitation of asphaltenes from bitumen with selected solvents.

2.1.33 *Modifier* — Properties of bitumen emulsion can be improved by incorporation of certain additives or blend of additives. These additives are called modifiers and the cationic bitumen. Emulsion modified with these modifiers is known as cationic modified bitumen emulsion. Cationic modified bitumen emulsion is expected to give higher life of surfacing depending upon degree of modifications and type of additives and modification process used.

N

2.1.34 *Naphthene-Aromatics* — A mixture of naphthenic and aromatic hydrocarbons which are adsorbed from a paraffinic solvent on an adsorbent during percolation and then desorbed with an aromatic solvent such as toluene.

2.1.35 *Non-recoverable Creep Compliance (Jnr)* — The residual strain in a specimen after a creep and recovery cycle divided by the stress applied in kPa.

P

2.1.36 *Penetration* — The consistency of a bituminous material expressed as the distance in tenths of a millimeter (0.1 mm) that a standard needle penetrates vertically a sample of the material under specified conditions of loading, time, and temperature.

2.1.37 *Phase Angle (δ)* — The angle in degrees between a sinusoidally applied strain and the resultant sinusoidal stress in a controlled-strain testing mode, or between the applied stress and the resultant strain in a controlled- stress testing mode.

2.1.38 *Polar-Aromatics* — A polar aromatic hydrocarbon fraction that is adsorbed on an adsorbing medium from a paraffinic solvent during percolation and then desorbed with a chlorinated hydrocarbon solvent such as trichloroethylene.

2.1.39 *Prime Coat* — An application of a low-viscosity bituminous material to an absorptive surface, designed to penetrate, bond, and stabilize this existing surface and to promote adhesion between it

and the construction course that follows.

R

2.1.40 *Reclaimed Asphalt Pavement (RAP)* — Bituminous pavement or paving mixture removed from its original location for use in recycled bituminous paving mixture.

2.1.41 *Recycled Asphalt Paving Mixture* — A mixture of reclaimed asphalt pavement with the inclusion, if required, of bitumen, emulsified asphalt or cut-back asphalt or foamed bitumen, recycling agent, mineral aggregate, and mineral filler.

2.1.42 *Recycling Agent (RA)* — A blend of hydrocarbons with or without minor amounts of other materials that is used to alter or improve the properties of the aged bitumen in a recycled asphalt paving mixture.

2.1.42 *Residue of Specified Penetration* — It is the percentage by mass of a residue obtained by heating a bituminous material to the required temperature and having a specified standard penetration value. Alternatively, the determination of residue of specified penetration is made at two stages, one giving a penetration higher than 100 and the other lower than 100, and the result is obtained by interpolation.

S

2.1.43 *Saturates* — Material that, on percolation in an n-heptane eluent, is not adsorbed under the specified test conditions.

T

2.1.44 *Tack Coat* — An application of bituminous material to an existing relatively non absorptive surface to provide a thorough bond between old and new surfacing.

2.2 Terminology for Tar Related Products

A

2.2.1 *Anthracene Oil* — The heavy fraction of distillate oil obtained from coal tar (above 300 °C) having a specific gravity between 1.05 and 1.1 at 38 °C.

2.2.2 *Ash* — Inorganic residue remaining after ignition of combustible substances.

B

2.2.3 *Bitumen, Macadam* — An open graded mixture of high quality aggregate with designed proportion of bitumen hot-mixed and hot-laid and rolled into ‘c’ most.

C

2.2.4 *Carbenes* — The organic components of bitumen which are soluble in carbon disulphide but insoluble in carbon tetrachloride.

2.2.5 *Carboids* — The inorganic matter present in bitumen which are insoluble in carbon disulphide.

2.2.6 *Carbon, Fixed* — The organic matter of residual coke obtained from heating hydrocarbon products in a covered vessel in the absence of oxygen.

2.2.7 *Creosote Oil* — The oils or a blend of oil fractions obtained from coal tar, when distilled between 200 °C and 300 °C.

P

2.2.8 *Phenols* — An oily constituent of coal tar, coal tar fractions or hydrogenated coal products, soluble in aqueous caustic soda solution.

2.2.9 *Pitch, Coal Tar* — The black or dark brown, solid or semi-solid, fusible and agglomerative residue remaining after partial evaporation or fractional distillation of coal tar.

2.2.10 *Pitch, Mastic* — A well graded mixture of mineral matter and coal tar pitch suitably blended, cooked and laid hot manually or mechanically by suitable float.

T

2.2.11 *Tar* — A viscous material heaving adhesive properties, obtained from the destructive distillation of certain types of organic materials. The word ‘tar’ shall be preceded by the name of the material from which it is obtained, that is, coal, shale, peat, etc. Its mode of production shall also be indicated.

2.2.12 *Tar, Coal (Crude Coal Tar)* — Tar produced by the destructive distillation of bituminous coal.

2.2.13 *Tar, Coke Oven* — Tar produced as a bye-product in a coke oven plant where coal is heated in a coke oven above 1 000 °C.

2.2.14 *Tar, Emulsion* — An emulsion in which fine droplets of tar are suspended in water with a suitable emulsifier.

2.2.15 *Tar, Gas House* — Tar produced in retorts during production of illuminating gas from coal.

2.2.16 *Tar, High Temperature* — The tar obtained as a byproduct in high temperature carbonization of coal. In high temperature carbonization, coal is heated above 1 000 °C.

2.2.17 *Tar, Horizontal Retort* — Tar obtained as a byproduct in the carbonization of coal in a horizontal retort.

2.2.18 *Tar, Low Temperature* — It is obtained by low temperature carbonization of inferior quality coal. Such tars are generally rich in phenolic components. In low temperature, inferior quality coal is heated to 750 ℃ to 1 000 ℃.

2.2.19 *Tar, Refined* — Tar obtained by direct distillation of coal tar or by fluxing tar pitch with anthracene oil and creosote oil to the required consistency.

2.2.20 *Tar, Vertical Retort* — Tar obtained as a bye-product in carbonization of coal in vertical retorts.

2.2.21 *Tar, Wood* — Tar obtained from the destructive distillation of wood.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION
Bitumen, Tar and Related Products Sectional Committee, PCD 06

Organization	*Representative(s)*
CSIR - Central Road Research Institute, New Delhi	DR AMBIKA BEHL **(*Chairperson*)**
Airports Authority of India, New Delhi	SHRI VINOD KUMAR SHARMA SHRI SUPRIO GOSH (*Alternate*)
Bharat Petroleum Corporation Limited, Mumbai	SHRI C. SHANMUGANATHAN MS SONAL MAHESHWARI (*Alternate*)
Birla Institute of Technology and Science, Pilani	SHRI SRIDHAR RAJU
CSIR - Central Road Research Institute, New Delhi	DR SIKSHA SWAROOP KAR
CSIR - North East Institute of Science and Technology, Jorhat	DR SHASHI D. BARUAH DR B. P. BARUAH (*Alternate*)
Central Public Works Department, New Delhi	SHRI DIVAKAR AGRAWAL
Chennai Petroleum Corporation Limited, Chennai	DR V. SELVAVATHI SHRI H. RAMAKRISHNAN (*Alternate*)
Dilip Buildcon Limited, Bhopal	SHRI B. B. KAMESWARA RAO SHRI ANUSH K.C. (*Alternate*)
Directorate General Border Roads, New Delhi	LT COL NITIN CHANDRA JOSHI SHRI ARNAB CHAKRABORTY (*Alternate*)
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	SHRI VIVEKANAND SHRI ANIL KUMBHARE (*Alternate* I) SHRI SACHIN VINAYAK ZOPE (*Alternate* II)
Engineer in Chief Branch, New Delhi	SHRI R. JAYAPRASAD SHRI O P SRIVATAVA (*Alternate* I)
GP Global Asphalt Private Limited, New Delhi	SHRI RAJESH KUMAR JAIN
G R Infra-Projects Limited, Gurugram	SHRI U.C. GUPTA
Highways Research Station, Chennai	MS ER. S. USHA DEVI SHRI ER. S. YAMINI (*Alternate* I)
Hindalco Industries Limited, Mumbai	SHRI HARSHAD KUMAR PANDIT
Hindustan Colas Private Limited, Mumbai	SHRI T. K. SUBHAASH SHRI K. G. RANGANATHA (*Alternate* I)
Hindustan Petroleum Corporation Limited (HP Green R & D Center), Bengaluru	SHRI B. RAVI SHRI K. RAGHAVA KRISHNA (*Alternate* I)
Hindustan Petroleum Corporation Limited, Mumbai	SHRI SANTOSH DHAKU BHOGALE
Indian Institute of Petroleum, Dehradun	SHRI MANOJ SRIVASTAVA DR KAMAL KUMAR (*Alternate* I)
Indian Institute of Technology Bombay, Mumbai	DR DHARAMVEER SINGH
Indian Institute of Technology Delhi, New Delhi	SHRI ARAVIND SWAMY

Organization	*Representative(s)*
Indian Institute of Technology Madras, Chennai	DR J. MURALI KRISHNAN DR A. VEERARAGHAVAN (*Alternate* I)
Indian Institute of Technology Roorkee, Roorkee	SHRI SHAM SUNDAR RAVINDRANATH
Indian Oil Corporation Limited - Refineries and Pipelines Division, New Delhi	MS ANINDITA MOITRASHRI K. SHRI SOUMEN MONDAL (*Alternate* I) SHRI P. MADHUSUDHANA REDDY (*Alternate* II)
Indian Oil Corporation Limited, New Delhi	DR N. S. RAMAN
Indian Oil Total Private Limited, Mumbai	SHRI PANKAJ KUMAR JAIN SHRI GAURAV GOGNE (*Alternate* I)
Indian Road Congress, New Delhi	SHRI S. K. NIRMAL SHRI R. V. PATIL (*Alternate* I)
IRB Infrastructure Developers Limited, Mumbai	SHRI SUDHIR HOSHING SHRI JITENDER CHAUHAN (*Alternate* I) MS SONALI SARKAR (*Alternate* II)
Ministry of Road Transport andHighways, New Delhi	SHRI SANJEEV KUMAR SHRI VARUN AGGARWAL (*Alternate* I)
National Institute of Technology, Warangal	SHRI VENKAIAH CHOWDARY DR S. SHANKAR (*Alternate* I)
National Rural Roads Development Agency, New Delhi	SHRI B. C. PRADHAN
National Test House, Kolkata	SHRI VINAY KUMAR
Nayara Energy Limited, Mumbai	SHRI MRIGANKA TARAFDAR SHRI DHIRAJ GONDALIA (*Alternate* I)
Om Infracon Private Limited, Guwahati	SHRI A. N. DAS
Ooms Polymer Modified Bitumen Private Limited, Gurugram	SHRI B.R. TYAGI SHRI PALASH KATHAL (*Alternate* I)
Shell Bitumen India Private Limited, Gurgaon	SHRI NILANJAN SARKER
Zydex Industries Limited	SHRI AJAY RANKA SHRI VISHAL SALUJA (*Alternate* I) SHRI HIMANSHU AGARWAL (*Alternate* II)
Director General, BIS	SHRIMATI MEENAL PASSI, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (PETROLEUM COAL AND RELATED PRODUCTS) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI HARI MOHAN MEENA
SCIENTIST 'C'/DEPUTY DIRECTOR
(PETROLEUM COAL AND RELATED PRODUCTS), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.

This Indian Standard has been developed from Doc No.: PCD 06 (18572).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi